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ABSTRACT

Historically genetic counseling programs have not included strong educational components or sound educational foundations. This paper deals with some of the drawbacks of current genetic counseling programs and the implications for education in the genetic counseling process. The author adopts a broad definition of genetic counseling which emphasizes a supportive communication process geared towards counseling and educating a patient through a potentially traumatic experience. The paper includes a description of this educational model for the genetic counseling process. (Author/DOW)

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GENETIC COUNSELING AS AN EDUCATIONAL PROCESS

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Genetic Counseling as an Educational Process

Recent and dramatic advances in medical genetics has resulted in an increased interest in genetic counseling programming. From this increased interest in genetic counseling has arisen many questions concerning the effectiveness of such programs. Several authors (Hall 1973, Hecht 1972, Riccardi 1975) have stated that genetic counseling is a form of preventive medicine and as such should incorporate appropriate educational components. Hall (1973) somewhat indicts her field of genetic counseling when she states, "It seems surprising that as investigators the genetic counselors have failed in the past to evaluate how they might themselves be better educators. We have failed to utilize the wealth of modern educational techniques and equipment." Historically genetic counseling programs have not included strong educational components or sound educational foundations. This paper will deal with some of the drawbacks of current genetic counseling programs and the implications of education in the genetic counseling process.

There are a variety of reasons for the recent increase in interest related to genetic counseling. First amniocentesis has increased the possibility of prenatal detection of certain genetic disorders and has enhanced the predictive capability of the medical profession related to X-linked disorders. The process of amniocentesis has also provided a degree of controversy due to the implication of the abortion issue. Littlefield (1973) feels that the abortion issue makes it difficult for some physicians and certain segments of society to develop a definite position on the role of amnocentesis. Second, the increase in the number of screening programs for specific genetic disorders (i.e., Tay Sachs disease, sickle cell anemia) has caused a demand for more and

better counseling services, through early identification of high risk populations (Fraser 1974). Third, state and federal governments which fianace institutions that care for individuals with mental and physical disorders are beginning to look to genetic counseling as a possible means to prevent the production of children with genetic diseases. Fourth, there has been an increase in overall public awareness of many genetic diseases. Fraser (1973) states, "Prevention of medical disease has always been regarded as desirable. Thus vaccination, quarantine of persons with communicable diseases and federal regulation of foods and drugs have all come under judical control. Genetic disorders could be considered communicable diseases even though they are transmitted vertically rather than horizontally. But the genetic isoloation by compulsory sterilization of individuals with lethal genes is not as acceptable to our society as physical isolation of the patient with tuberculosis or leprosy." Fraser seems to illustrate the dilemma facing governmental officals. The major concern is to select those methods of genetic counseling which yield optimal results for both the government and society without infringing on individual freedoms.

Changing Concept of Genetic Counseling

It is important to look at the recent evolution in the definition of genetic counseling. Selwyn (1973) in the National Foundation/March of Dimes pamphlet, Genetic Counseling, defines genetic counseling as follows:

> Genetic counseling provides and interprets medical information based on expanding knowledge of human genetics, the branch of science concerned with heredity. Its major goal is to prevent the

> occurrence of birth defects - abnormalities of body structure or function, or in mental development, that too often preclude the healthy start in life that is the right of every child and the hope of every parent.

This definition seems to minimize the educational and counseling aspects of genetic counseling. Sly (1973) states "Genetic counseling is the delivery of professional advice concerning the magnitude of the implications of and the alternatives for dealing with the occurence of a hereditary disorder within a family." Sly's definition also appears to limit attention to educational and counseling components.

Compare the definitions of genetic counseling offered by Selwyn and Sly with those of the Committee on Genetic Counseling of the American Society of Human Genetics (1975) and Hecht and Holmes (1972). The Committee on Genetic Counseling of the American Society of Human Genetics states:

> Genetic counseling is a communication process which deals with the human problems associated with the occurence or the risk of occurence, of a genetic disorder in a family. This process involves an attempt by one or more appropriately trained persons to help the individual or family to (1) comprehend the medical facts, including the diagnosis, probable cure of the disorder, and the available management; (2) appreciate the way heredity contributes to the disorder, and (3) understand the alternatives for dealing with the risk of recurrence; (4) choose the course of action which seems to them appropriate in view of the risk, their family goals, and their ethical and religious standards, and to act in accordance with that decision, and (5) to make the best possible adjustment to the disorder in an affected family member and/or to the risk of recurrence of the disorder.

The emphisis of this definition is on communication rather than medical diagnosis. The definition also implies that certain educational and counseling components are inherent to success in any genetic counseling endeavor. Hecht and Holmes (1972) expand the counseling component of genetic counseling when they state, "The counselor is engaged in a complex psychodynamic process that involves the lessening of denial, the

relief of guilt, the lifting of depression, the articulation of anger and gradually the rational planning for the future." Therefore, the "state of the art" in genetic counseling seems to have evolved from a process which stressed medical diagnosis and desemination of facts to patients, to a communicative process geared towards counseling and educating a patient through a potentially traumatic experience.

State of the Art in Genetic Counseling

At this point it would be appropriate to discuss current genetic counseling procedures in order to lay background material from which implications may be drawn. Fraser (1974) breaks the process of genetic counseling down into four components; (1) genetic work-up and estimate of risk, (2) communication of risk to counselee(s), (3) decision and appropriate action, and (4) family follow-up. It should be understood that ideally the counseling should be tailored to the needs of the counselee(s).

The genetic work-up and estimate of risk incorporates two components; an evaluation of family history, and an estimation of risk. In the process of evaluating the family history, a detailed family history is taken and a pedigree is constructed. It may be useful to record racial background, occupation, religion, grandparents' birthplace, and miscarriages and stillbirths of close relatives. All this information is useful in the construction of the pedigree. The pedigree may help in the diagnosis by revealing specific patterns of inheritence, and making an estimate of risk possible, even if the exact diagnosis is in doubt.

During the estimation of risk, it is often necessary to apply the relevent knowledge from current literature to the problem. Other details specific to certain diseases (i.e., how long a Tay Sachs baby will live or when will the symptoms of Huntington's disease appear) may also be gathered during the literature search.

The first counseling session usually entails the communication of the risk to the counselee(s). At this time the risk of recurrence, with all its implications must be conveyed to the counselee(s). The risk it usually presented against a background of the two percent to three percent risk that any child has of being afflicted with a major disorder of some kind. Sly (1973) feels that some people cannot grasp the concept of probability and will easily misunderstand the risk. Sly advocates the use of audio-visual materials or simple analogies, such as coin flipping, to help illustrate the risk. At this time there may be a myriad of psychological conflicts which may hinder the counseling process. These conflicts will be discussed later in this paper.

Ideally, the follow-up procedures should be initiated following the first counseling session. These procedures should include a letter to the counselee(s) reiterating pertinent facts and a letter to the referring physician delineating what procedures were taken. The follow-up procedures may help to determine the extent to which the counselee(s) has grasped the information.

The next step in the counseling procedure is decision-making and appropriate action. There are many many factors which effect this decision-making process. Fletcher (1973) suggests that the struggle to make a decision is intensified by what is termed "moral suffering."

"Moral suffering occurs most often in those situations in which any course of action will cost the decision-maker dearly in terms of compromised principles, values and aspirations." We are living in times of rapid change, and new medical and technological advance. Genetic counseling and amniocentesis are examples of such changes. In times of rapid change the conventional morality governing human sexuality, marriage, and family life may not apply to these new conflicts of conscience. This lack of existing social mores in the areas of genetic counseling and amniocentesis may therefore complicate the decision-making process.

There are a variety of options open to the counselee(s) depending on whether the woman is pregnant. If pregnant, the prospective mother may elect to carry the baby to term and chance the risks involved. In certain cases where the genetic disorder may be detected early in the pregnancy by amniocentesis, the counselee(s) may elect to go through the process of amniocentesis and abortion. And, in cases where the pedigree indicates a high risk of a genetic defect and amniocentesis is not applicable, the counselee(s) may elect to have an abortion. Fletcher (1973) interviewed twenty-five couples who had gone to the George Washington University Medical School for genetic counseling. The couples elected to come for counseling for a variety of reasons, but surprisingly all the couples agreed that abortion was a morally acceptable means of managing a genetic problem. Fletcher hypothesized two reasons for the counselees' opinion on abortion. "1) An experience with genetically defective children which led them to believe that the child's life would go unfulfilled, and 2) a belief in the values of health and intelligence which their life style requires for a sense of adequacy and success."

Although Fletcher's study has certain limitations, it is interesting to observe how this group dealt with the highly controversial and moral issue of abortion when juxtaposed to the ethical problem of the production of children with genetic disorders.

For the counselee who is not pregnant, the options may appear to be more plentiful and pose a reduced amount of "moral suffering." Contraception may be elected to provide the couple time to decide on the appropriate course of action for them. This may also grant the counselee(s) time to see if new technological and medical advances (for example, the list of diseases that can be detected by amniocentesis increases every year) can help in the decision-making process. Other options available are sterilization, adoption (which appears to be becoming difficult for those individuals who want to adopt caucasian neonates), and divorce. These four options may cause some degree of moral suffering due to the possible compromise in the aspirations related to child rearing the counselees may have developed. In cases where the disease is autosomal recessive or where the husband is the carrier, the counselees may select the process of artificial insemination as a solution. Because of the legal questions related to artificial insemination, this option is seldom chosen as a solution to genetic problems.

Carter (1971) conducted a study to determine the decisions parents made concerning future pregnancies. One hundred seventy high risk and two hundred fifty one low risk couples were used in the study. Low risk was set at a less than ten percent chance of contracting a genetic disorder, while high risk was considered a greater than ten percent chance. In the high risk group Carter found that one hundred nine couples decided against further pregnancies. Of that group, twenty-three couples adopted one or more children, 2 couples used artificial

insemination, 2 fathers and seventeen mothers were sterilized, 2 couples were separated, and 3 couples were divorced. In the low risk group sixty couples were deterred by the risk. Of that group, couples adopted one or more children, 2 mothers were sterilized, 1 couple was separated, and 3 couples were divorced. Carter's study was a follow-up on patients counseled between the years 1952 and 1964. It would be interesting to replicate Carter's study today to see how values have changed in recent years.

The final step in the genetic counseling procedure is the family follow-up. The family follow-up is useful for two main reasons. It gives the counselor a chance to counsel high risk relatives while reassuring low risk relatives. Also, the family follow-up enables the physician to employ preventative measures on relatives who may possibly be suffering from the genetic disorder.

Educational Limitations of Genetic Counseling

Two recent studies (Reiss and Menashe, 1972 and Leonard, 1972) seem to indicate that there may be something wrong with the way genetic counseling is administered. Reiss and Menashe (1972) conducted a study to assess parents' knowledge about the recurrence risk of congenital heart disease, and their retention of that knowledge. The sample included thirty-five families. Even though the families expressed an interest in the probability of recurrence in subsequent children, only 9 of the thirty-five knew the potential mathematical risk. These interviews, conducted one to four months after the families were counseled, seem to show that information was apparently not readily understood and was poorly retained.

Leonard (1972) conducted a study with parents who had children afflicted with phenylketonuria, cystic fibrosis, and Down's Syndrome. The study was designed to assess the parents' understanding of the genetic counseling they received. Seventy-six families were used in the study. In spite of the fact that all the families received counseling, approximately fifty percent appeared to have a good grasp of the information and twenty-five percent appeared to have gained very little from the counseling they received.

An interesting sub-study was the families response to the counseling they received. Only 2 couples went back for further counseling. Five families claimed that they were never exposed to the counseling. Five families stated that the genetic information was not retained due to emotional shock. Four families claimed an inability to understand genetics, while five families stated they were unable to apply their knowledge of probability to their case. And, in 6 families, the denial was so great that the families could not accept some aspects of the counseling.

Related to parents' attitude toward further reproduction, Leonard noted that forty-five percent considered the genetic problem ample reason to curtail further reproduction, thirty-two percent did not consider the genetic problem ample reason to limit family size, and twenty-three percent had ambivalent feelings towards the the issue. In this case, Leonard stated that "Evidence given by the families suggusts that reproductive attitudes are determined more by the sense of burden imparted by the disease than by knowledge of its precise risk."

At this time it seems appropraite to discuss some reasons for the apparent failure of some genetic counseling experiences to equip counselees with the knowledge necessary to make appropriate decisions.

A variety of authors (Degnan 1975, Fletcher 1973, Fraser 1974, Freeman 1971, Hecht 1972, and Sly 1973) have expressed concern out of the fact that the emotional state of the patient at the time of the counseling may not be given adequate attention. Degnan (1975) states that there is a normal period of grief when parents discover that they have produced a defective child, or in some cases that they have the potential to produce defective children. Degnan feels that the normal period of grief following the death of a loved one may be about 6 months, where as the parents of a handicapped child may never stop feeling remorse over the loss of normality of their child. All families go through a mourning process after the birth or identification of a defective child. These people seldom progress smoothly from shock to disbelief acceptance. Degnan also feels that parents experience varying periods of denial of diagnosis, and "shopping around" for a diagnosis they want to hear, followed by sequences of depression, rejection and overprotection.

An interesting analogy is the relationship of Degnan's statement concerning the emotional state of genetic counseling patients and Kubler-Ross's (1969) 5 stages of dying. Kubler-Ross studied a large number of terminally ill patients and found these patients almost universally progressed through five emotional stages; denial, anger, bargaining, depression, and acceptance. Kubler-Ross feels that if given enough time, the patient works through the other stages and accpets his fate. Kubler-Ross's theory has some implications for genetic counselors. The counselor must be prepared to deal effectively with the problems of denial, anger, and depression in order to effectively counsel. The genetic counseling process should help the patients work out their

problems in a healthy way. This implies that genetic counseling is an ongoing process and must be continued through the mourning process. Hecht (1972) feels that along with the desemination of information and assistance in planning for the future, the genetic counselor must lessen the denial, relieve the guilt, lift the depression, and help the patient articulate the anger in order to be successful.

The inability of the genetic counselor to deal with emotional problems or the lack of counselor time available to deal with emotional problems may perhaps be a partial cause of the relatively poor knowledge and retention of recurrence risk data (Reiss and Menashe 1972 and Leonard 1972).

The genetic counselor must also be able to deal with guilt feelings that may surface in the counselee(s). Freeman (1971) states that guilt feelings may surface in the counselee(s) for a variety of reasons. The production of a defective child, negative feelings towards the child, not doing enough for the child, doing too much for the child to the exclusion of the spouse or other siblings, unhappiness with a current pregnancy, and the desire to send the child to an institution may produce guilt feelings by the counselee(s). Again, it should be stated that the limited number of genetic counselors and the resulting lack of contact time available for each counselee may not facilitate the appropriate relief of guilt necessary for a successful counseling experience. It seems possible that in the future assistance may be available from such sources as nurses or health educators to help eliminate this particular problem. For example, a team approach to genetic counseling may be an appropriate expectation in the near future.

At this time it would be appropriate to discuss (1) the qualifications of the genetic counselor and (2) who is the best person or persons to provide genetic counseling. Epstein (1973) struggled with the problem of who should do genetic counseling and under what circumstances, but failed to delineate any concrete solutions to the problem. Hecht (1972) states that the following questions concerning genetic counseling still remain unanswered; (1) who is the best counselor (an M.D., a Ph.D., and M.S. in genetic counseling), (2) does the internist, the pediatrician, the obstetrician, or the psychiatrist have enough training to provide genetic counseling services, (3) is the family physician adequately trained to provide genetic counseling services, and (4) how well do lay genetic counselors function (i.e., volunteers at a sickle cell anemia clinic). It seems apparent that adequate research has not been conducted to ascertain the answers to these questions. The increased demand for genetic counseling services may lead the way to research in this area, with an emphasis placed on identifying the mechanism which most efficiently transmits the information necessary for appropriate decision-making on the part of the clients.

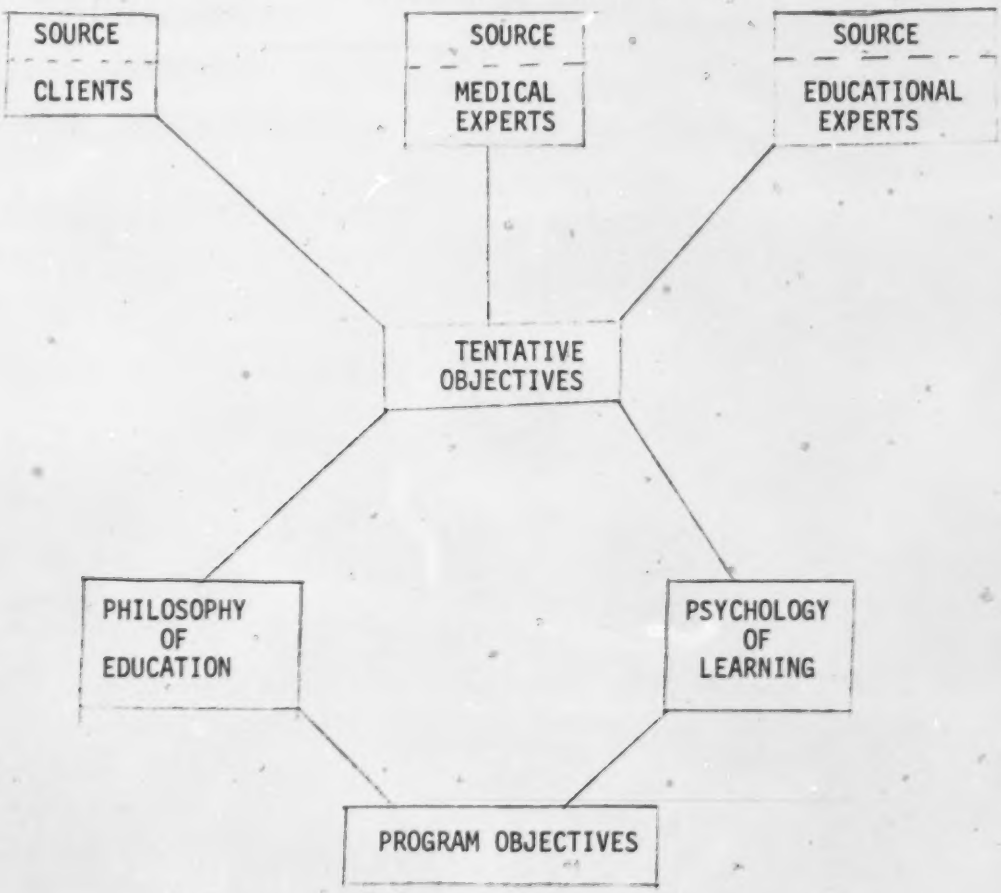
Hall (2973) feels that genetic counseling is an educational process. However, there appears to be a lack of training in modern educational methodologies in current medical school curriculi. Therefore, it would appear that in the educational aspects of genetic counseling, physicians may lack the appropriate skills. Also, the questions of whether physicians possess adequate counseling skills or have the time necessary to give the appropriate individual attention needed in this area, remain unanswered. Again it is at this point in the process that health educators may play an important role.

An Educational Model for the Genetic Counseling Process

If the process of genetic counseling is to succeed in educating patients to make inform decisions, it should be dealt with as an educational process. To insure the success of any educational program, the processes of planning, implementation, product, evaluation, and recycling should be incorporated into the development and normal functioning of that program.

Diagram #1 outlines the procedures that should be followed in the planning stage of a genetic counseling program.

Diagram #1 Rationale for Planning Genetic Counseling Programs (Tyler, 1950)



The medical profession usually dictates the scope and sequence of most genetic counseling programs. Ideally, the development of a genetic counseling program should include imput from three sources; past client experience, medical experts, and educational (including counseling) experts. Examining past programs and clients can provide data and insights concerning how a program might function more efficiently. The medical experts can provide information which deals with all aspects of medical genetics. The educational experts can deal with the problems related to educational methodologies, educational media and counseling techniques. In addition, they should be sensitive to outcome expectations in relation to the cognitive, affective and behavioral realms. Attention to the affective components of the genetic counseling process have been somewhat limited. It is anticipated the inclusion of these three sources in the planning of a genetic counseling program will function to develop tentative program objectives that are medically sound, but also meet the problems, needs and interests of the prospective counselees.

Once the three sources have developed tentative program objectives, these objectives should be screened through a valid philosophy of education and the current psychology of learning.

A valid philosophy of education for a genetic counseling program might include some or all of the following components. These components are generic to many educational endeavors.

1. The program should have as a prime objective the selection of competent counselors. Research should be undertaken to determine specific skills all genetic counselors should possess.

2. The genetic counseling program should have affective and decision-making components in addition to a cognitive component. The ability to assist counselees to make valid decisions entails more than just the dissemination of information.

3. The genetic counseling program should utilize all appropriate technological advances to its advantage. The literature in the area of genetic counseling fails to describe a single program that has realized the potential usefulness of educational media (i.e., video-tape, slides, cassettes, etc.).

4. Relevant, up-to-date, accurate and unbiased information must be the focal point of the genetic counseling experience. Doctors are still held in high esteem by a large percentage of the populace. It is their moral obligation to disseminate accurate information untainted by personal values.

The tentative program objectives are also screened through the current psychology of learning. Some of the components of a psychology of learning may include the following:

1. The counselees span a wide range of educational and cultural backgrounds. These factors should be taken into consideration when developing a program. Learning is more effective when geared to the educational and cultural backgrounds of the counselees.

2. In a potentially stressful situation, such as genetic counseling, the counselor has to be prepared to take as much time as necessary to deal with the emotional problems of the counselee. The counselor has to be able to lessen the denial, relieve the guilt, lift the depression, and articulate the anger in many cases before a valid learning process can take place.

3. Individuals learn through a variety of methods. Alternatives to traditional learning strategies must be utilized to enable the counseling to reach a wider range of counselees.

After the tentative program objectives have been screened through a philosophy of education and a psychology of learning, the final program objectives are developed. Now the genetic counseling program is implemented. During the implementation of the program, data is constantly being collected. This is the product. It is important in the development and implementation of any program that valid and reliable measuring devices be utilized to gather the product.

The final stages in the development and implementation of a genetic counseling program are evaluation and recycling. The data gathering must be evaluated, and the results recycled back to the planning stage. This allows for a dynamic genetic counseling program that is constantly evolving to meet the changing problems, needs, and interests of the counselees.

Implications for Health Educators

In the near future, the health educator may find themselves involved in genetic counseling for the following reasons: (1) community health settings are developing genetic counseling programs (2) health educators should have the skills and training to support the attainment of the goals of genetic counseling (3) the changing emphasis in professional preparation in health education toward the behavioral sciences should bring about a sensitivity towards the problems associated with genetic counseling (4) genetic counseling may be moving towards a team approach. The health educator having traditionally functioned within a team approach may be an integral component of a genetic counseling team. (5) Genetic counseling is becoming an area of special interest within some health education programs.

There appears to be many unanswered questions related to genetic counseling. The demand for counseling services has increased in the past decade due to a variety of innovations in the area of human genetics. In the process of increasing the genetic counseling services available to the public, the profession has gone through a series of "growth pains." Perhaps it is time to evaluate genetic counseling programs in terms of quality instead of quantity.

There is no panacea for genetic counseling, but health educators should be aware of the need to make the process of genetic counseling more humanistic in its approach.

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Selected Bibliography

Ashery, R.S., "A Study of the Relationship Between Manifest Anxiety and Social Work Intervention of Couples having Amniocentesis for Parental Diagnosis of Genetic Defects," Doctoral Dissertation, The Catholic University of America, 1976, 207 pp.

Avers, C.J., Biology of Sex, John Wiley and Sons Inc., New York, 1974, pp. 66-69.

Berman, A.B. and Stamm, S.J., "The Morbidity of Cardiac Nondisease in School Children," New England Journal of Medicine, Volume 276, 1967, pp. 1008-1013.

Bowen, P., "Genetic Counseling in Mental Retardation," E.R.I.C. (# 082-405), 1973, 8 pp.

Carter, C.O., Et. Al. "Genetic Clinic: A Follow-Up," Lancet, Volume 1, 1971 (Feb. 6), pp. 281-5.

Degnan, M.; Peters, P.; Porter, I.; and Gottesman, D., "Genetic Counseling," American Family Physician, Volume 12, 1975 (July), Number 1, pp. 111-117.

Epstein, C.J., "Who Should Do Genetic Counseling and Under What Circumstances," Birth Defects: Original Article Series, Volume 9, 1973 (April), Number 1, 1973, pp. 39-48.

Fletcher, J., "Parents in Genetic Counseling: The Moral Shape of Decision-Making," pp. 301-327 In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenum Press, New York, 1973, 453 pp.

Fraser, F.C., "Genetic Counseling," American Journal of Human Genetics, Volume 26, 1974 (Sept.), Number 5, pp. 636-661.

Fraser, F.C., "Survey of Counseling Practice," pp. 7-22 In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenum Press, New York, 1973, 453 pp.

Freeman, R.D., "The Crisis of Diagnosis: Need for Intervention," The Journal of Special Education, Volume 5, 1971, Number 4, pp. 389-414.

----- "Genetic Counseling," American Journal of Human Genetics, Volume 27, 1975 (March), Number 2, pp. 240-242.

Hall, J. "The Concerns of Doctors and Patients," pp. 23-42, In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenem Press, New York, 1973, 453 pp.

Hecht, F., and Holmes, L.B., "What We Don't Know About Genetic Counseling," The New England Journal of Medicine, Volume 287, 1972, Number 9, pp. 464-465.

Kilbrandon, L., "The Comparative Law of Genetic Counseling," pp. 245-260 In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenum Press, New York, 1973, 453 pp.

Leonard, C.O.; Chase, G.A.; and Childs, B., "Genetic Counseling: A consumers View," The New England Journal of Medicine, Volume 287, 1972, Number 9, pp. 433-439.

Littlefield, J.; Milunsky, A.; and Jacoby, L.B., "Parental Genetic Diagnosis: Status and Problems," pp. 43-57, In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenum Press, New York, 1973, 453 pp.

Marks, J. and Richter, M., "The Genetic Associate: A New Health Professional," The American Journal of Public Health, Volume 66, 1976 (April), Number 4, pp. 388-390.

National Institute of Child Health and Human Development, "Antenal Diagnosis and Sown's Syndrome," E.R.I.C. (#094-545), 1973, 16 pp.

Neel, J.V., "The Coming of Age of Genetic Counseling," Birth Defects: Original Article Series, Volume 9, 1973 (April), Number 4, pp. 1-4.

Pashayan, H., "The Basic Concepts of Medical Genetics," Journal of Speech and Hearing Disorders, Volume 40, 1975 (May), Number 2, pp. 160-163.

Reiss, J.A. and Menashe, V., "Genetic Counseling and Congenital Heart Disease," The Journal of Pediatrics, Volume 80, 1972 (April), Number 4, pp. 655-656.

Riccardi, V.M., "Health Care and Disease Prevention throught Genetic Counseling: A Regional Approach," The American Journal of Public Health, Volume 66, 1976 (March), Number 3, pp. 268-270.

Singer, D.M., "Impact of the Law on Genetic Counseling" Birth Defects: Original Article Series, Volume 9, 1973 (April), Number 4, pp. 34-38.

Sly, W.S., "What is Genetic Counseling "Birth Defects: Original Article Series, Volume 9, 1973 (April), Number 4, pp. 5-18.

Sonneborn, T.M., "Ethical Issues Arising from the Possible Use of Genetic Counseling," pp. 1-6, In: Hilton, B., Et. Al., Ethical Issues in Human Genetics, Plenum Press, New York, 1973, 453 pp.

Tyler, R.W.; Basic Principles of Curriculum Development, The University of Chicago Press, Chicago, IL, 1950.

Wallace, B., "Genetics and the Quality of Life," The American Biology Teacher, Volume 35, 1973 (April), Number 4, pp. 183-186.